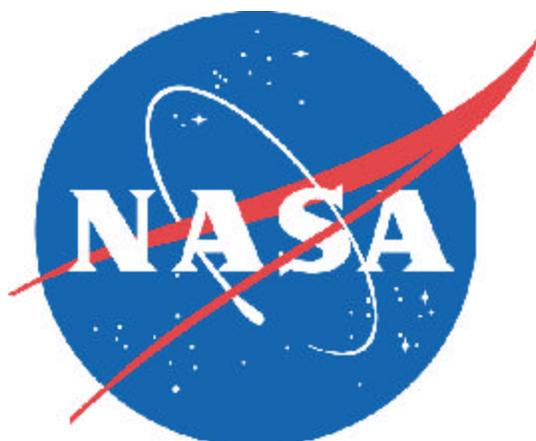

Subject: Program Pre-Formulation



**NASA Headquarters
Office of Space Science (OSS)**

Office Work Instruction

Program Pre-Formulation

Approved by: (Original signed by Christopher J. Scolese) Date: (06/23/2003)
Christopher J. Scolese
Deputy Associate Administrator for Space Science

Subject: Program Pre-Formulation

DOCUMENT HISTORY LOG

STATUS (BASELINE/ REVISION/ CANCELED)	DOCUMENT REVISION	EFFECTIVE DATE	DESCRIPTION
Baseline		06/23/2003	• Initial "baseline" version of the OWI.

Subject: Program Pre-Formulation

1. PURPOSE

The purpose of this Office Work Instruction (OWI) is to define the process by which the Office of Space Science (OSS) performs Pre-Formulation activities for programs that are not yet mature enough to have an approved Formulation Authorization Document.

2. SCOPE AND APPLICABILITY

- 2.1 NPG 7120.5 specifies that the Formulation subprocess for a new program begins with the approval of a Formulation Authorization Document (FAD). However, significant work must be performed in developing the content of a candidate program prior to FAD approval during a period known as Program Pre-Formulation.
- 2.2 The scope of this OWI is confined to the following Program Pre-Formulation activities: (a) Advanced Concept Studies, (b) Pre-Concept Definition, and (c) Technology Development.
- 2.3 This OWI is applicable to all OSS flight programs, although each of the Program Pre-Formulation activities identified in Paragraph 2.2 may not be required for all programs.

3. DEFINITIONS

- 3.1 AA. Associate Administrator for Space Science.
- 3.2 Announcement of Opportunity (AO). A specific research opportunity for which relatively well-defined science investigations are solicited, usually in association with a specific NASA space mission that may (but does not always) involve the provision and operation of experiment hardware and that is typically funded by a unique Federal budget appropriation.
- 3.3 Formulation subprocess. This first subprocess in program management or project management defines a program or project concept and plan for implementation to meet mission objectives or technology goals specified in either the NASA Strategic Plan or an Enterprise's Strategic Plan and results in a Program Commitment Agreement (PCA) and a Program Plan or Project Plan.

Subject: Program Pre-Formulation

3. DEFINITIONS *(continued)*

- 3.4 Governing Program Management Council (GPMC). The highest-level PMC that regularly reviews the program or project. The determination of whether a cognizant Center's PMC, an Enterprise's PMC, or NASA's agency-wide PMC is "governing" for a specific program or project is made by the NASA agency-wide PMC.
- 3.5 NASA Research Announcement (NRA). A general research opportunity that solicits relatively non-specific laboratory theoretical research, technology, data analysis, or education investigations that are funded by NASA's yearly, ongoing budgets.
- 3.6 Program. An activity within an Enterprise having defined goals, objectives, requirements, and funding and consisting of one or more projects. It reports to its designated GPMC.
- 3.7 Program Executive. In accordance with delegation authority from the Associate Administrator for Space Science, responsible for: (a) providing program policy, strategy, and standards that support OSS goals and standards; (b) determining program objectives, goals, and requirements; (c) approving principal program documents; (d) allocating funds to ensure successful implementation of the program; and (e) assessing program performance.
- 3.8 Program-Level Requirements Appendix. The document that establishes the baseline for project implementation, including the Level 1 requirements as well as the agreements among the Program Executive, Program Scientist, cognizant OSS Division Director, managing Center Director, implementing Center Director, and Program Manager. This document is an appendix to the Program Plan under whose management authority it reports at the NASA Center.
- 3.9 Program Plan. The document that establishes the baseline for program implementation, including Program-Level Requirements, as well as the agreements among the Enterprise Associate Administrators, the managing Center Director, the implementing Center Director, and the Program Manager.
- 3.10 Program Scientist. In accordance with delegation authority from the Associate Administrator for Space Science, responsible for: (a) providing science policy, strategy, and standards that support OSS goals and standards; (b) determining science objectives, goals, and requirements; (c) approving principal program documents; (d) providing science leadership for the program; and (e) assessing science performance.

Subject: Program Pre-Formulation

3. DEFINITIONS *(concluded)*

- 3.11 Project. An activity designated by a program and characterized as having defined goals, objectives, requirements, life-cycle costs, a beginning, and an end.
- 3.12 Roadmaps. Documents assembled by representatives of the research community that describe alternative future flight, research, and technology-development programs within their areas of competence.
- 3.13 Science and Technology Definition Team (STDT). A panel of scientists and technologists appointed by the Director of an OSS Science Division for the purpose of maturing a mission advanced concept into a pre-concept. The STDT coordinates its activities with the science community and produces a report containing science objectives, operations concepts, mission design architectures, spacecraft concepts, cost, schedule, risk assessment, and identification of required new technology.
- 3.14 Technology Readiness Levels (TRL's). A systematic metric/measurement system that supports assessments of the maturity of a particular technology and the consistent comparison of maturity between different types of technology.

TRL 1: Basic principles observed and reported

TRL 2: Technology concept and/or application formulated

TRL 3: Analytical and experimental critical function and/or characteristic proof-of-concept

TRL 4: Component and/or breadboard validation in laboratory environment

TRL 5: Component and/or breadboard validation in relevant environment

TRL 6: System/subsystem model or prototype demonstration in a relevant environment (ground or space)

TRL 7: System prototype demonstration in a space environment

TRL 8: Actual system completed and "flight qualified" through test and demonstration (ground or space)

TRL 9: Actual system "flight proven" through successful mission operations

Subject: Program Pre-Formulation

4. REFERENCES

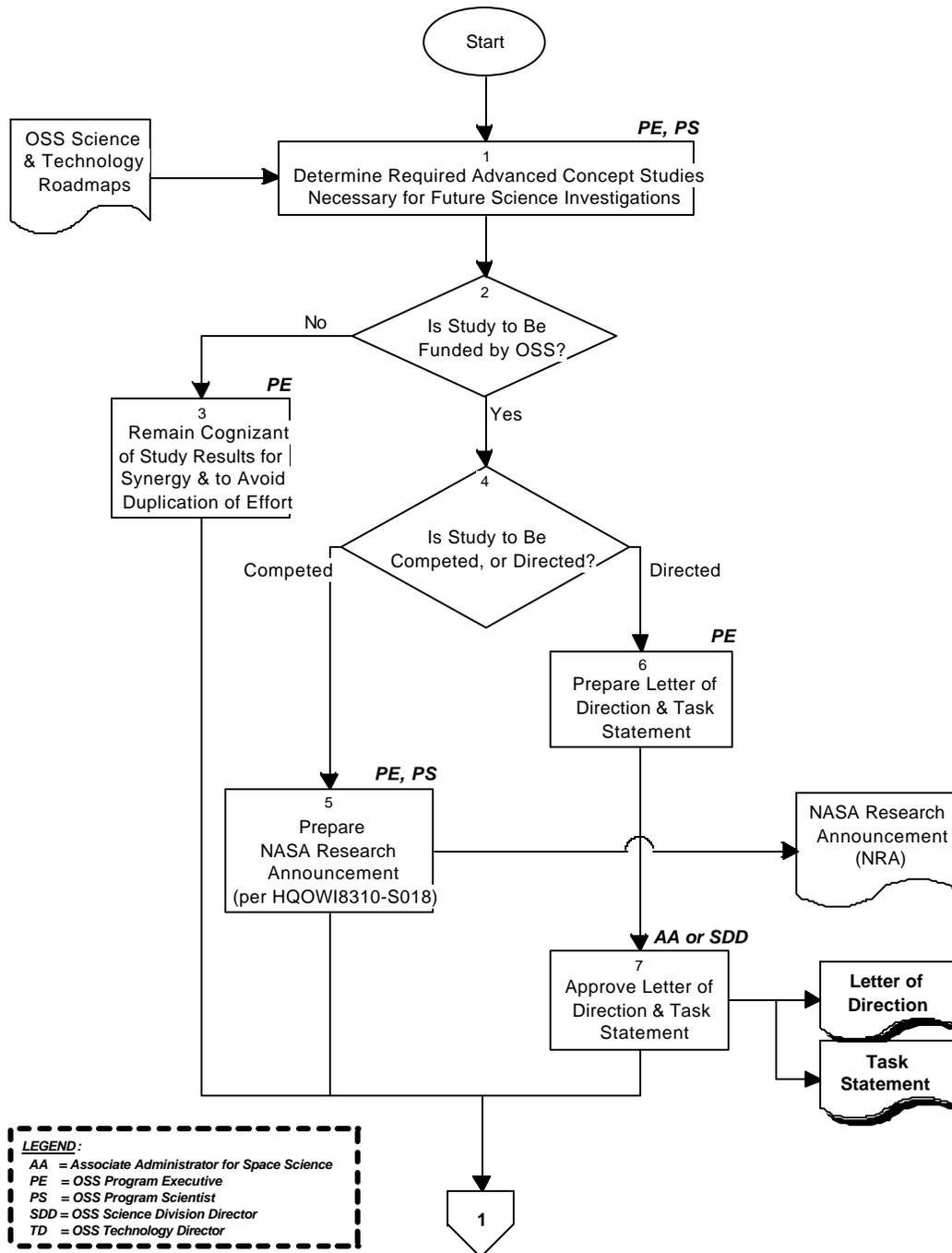
- 4.1 NPG 1441.1 NASA Records Retention Schedules (NRRS)
[http://nodis3.gsfc.nasa.gov/library/lib_docs.cfm?range=1___]
- 4.2 NPG 7120.5 Program and Project Management Processes and Requirements
[http://nodis3.gsfc.nasa.gov/library/lib_docs.cfm?range=7___]
- 4.3 SSE MH2002 Space Science Enterprise Management Handbook
[<http://spacescience.nasa.gov/admin/pubs/handbook/OSSHandbook.pdf>]

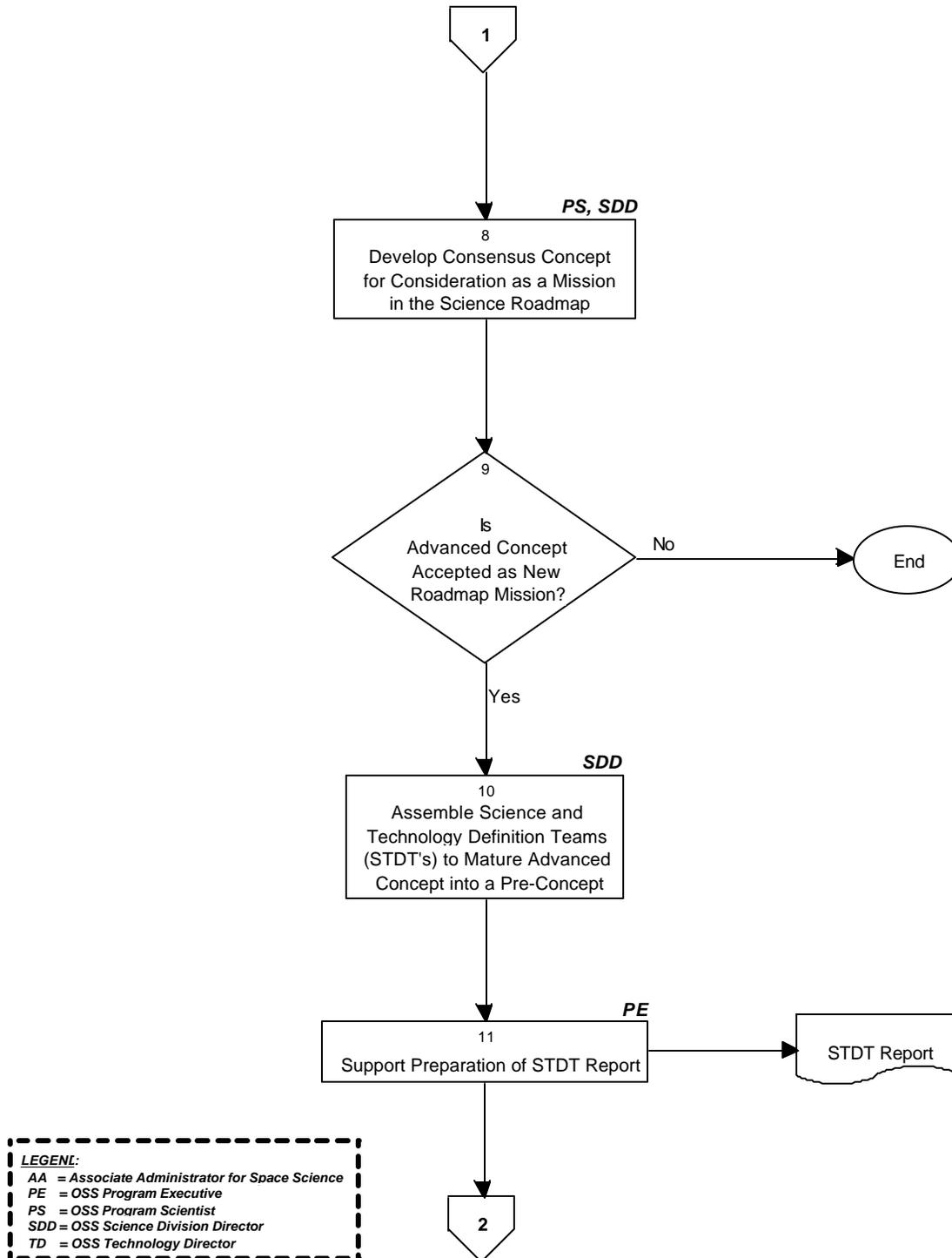
Subject: Program Pre-Formulation

5. FLOWCHART

[NOTE #1: Process steps are numbered in accordance with their corresponding step numbers in Section 6.]

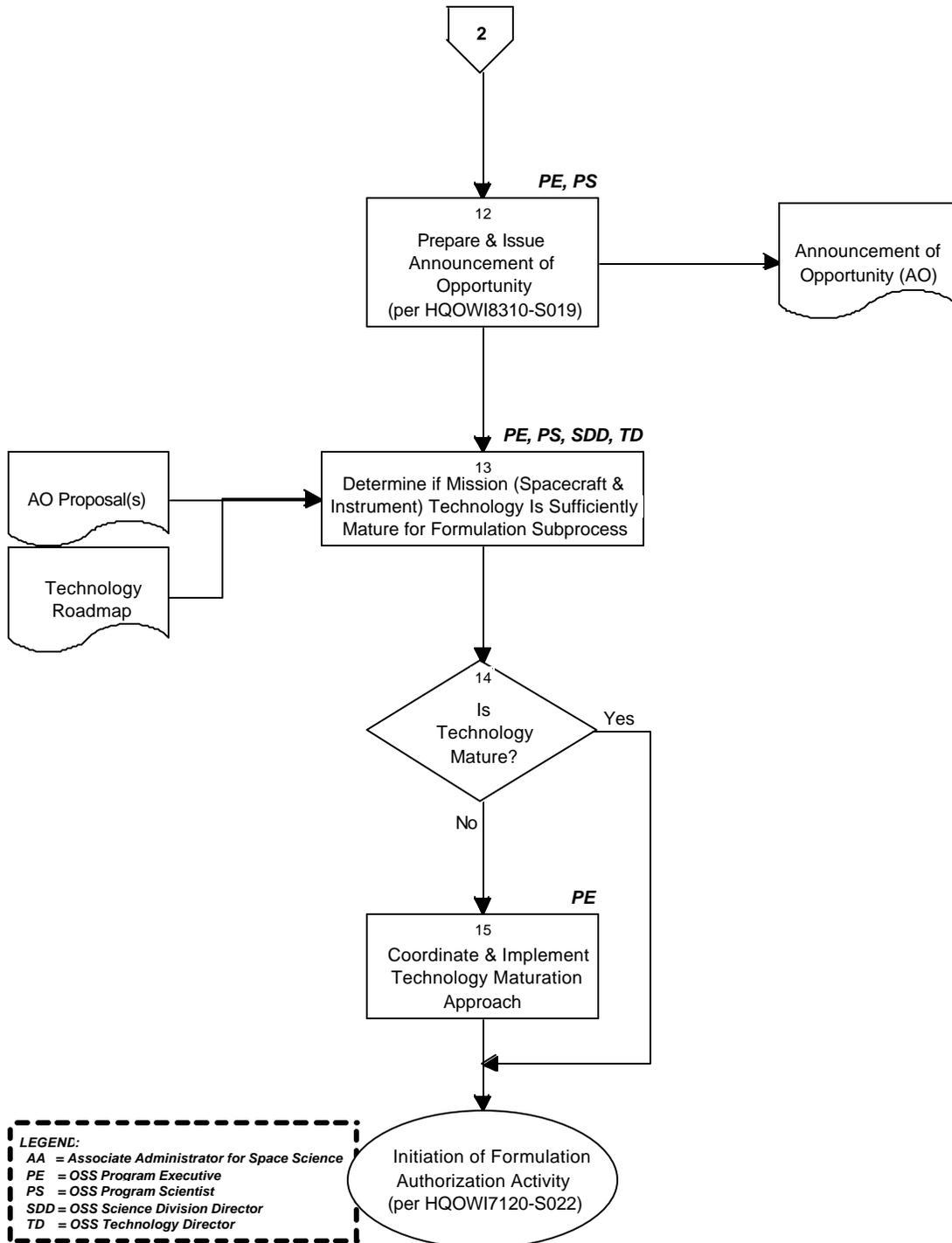
[NOTE #2: "Quality records" are identified via bold-text titles and shadowing of the border of their symbols.]



Subject: Program Pre-Formulation**5. FLOWCHART (continued)**

Subject: Program Pre-Formulation

5. FLOWCHART (concluded)



Subject: Program Pre-Formulation**6. PROCEDURE**

<u>STEP #</u>	<u>ACTION OFFICERS</u>	<u>DESCRIPTION</u>
		<i>[The process is initiated to support the introduction of future missions and associated technology requirements into the OSS roadmaps.]</i>
1	Program Executive Program Scientist	The Program Executive and Program Scientist support the OSS science themes in the grouping and advocacy of sets of mission concepts into new budget initiatives, which, if successful, transition into new programs. The Program Executive and Program Scientist work together to develop mission concepts that are consistent with the science and technology roadmaps. Advanced-concept studies may be initiated to define new missions and to determine their feasibility and desirability. OSS science and technology roadmaps (see HQOWI7020-S001) are an input into this process.
2		Advanced concepts for future space-science investigation are derived from three distinct sources: (a) independently-funded publications in peer-reviewed journals and presentations at science conferences; (b) NASA-funded Research Announcements; and (c) OSS management direction to a NASA Center. Sources from (b) and (c) are funded by OSS, while sources from (a) are not. If an advanced-concept study will be funded by OSS, proceed to Step #4. If it will not be funded by OSS, proceed to Step #3.
3	Program Executive	If the advanced-concept studies are funded outside of OSS funding authority, no Program Executive action is required other than to remain cognizant of the study results for synergy and to avoid duplication of effort. Proceed to Step #8.

Subject: Program Pre-Formulation**6. PROCEDURE** *(continued)*

<u>STEP #</u>	<u>ACTION OFFICERS</u>	<u>DESCRIPTION</u>
4		If an OSS-funded advanced-concept study will be competed via a NASA Research Announcement, proceed to Step #5. If the Associate Administrator for Space Science or the NASA Administrator determines that a NASA Center should perform the study, proceed to Step #6.
5	Program Executive Program Scientist	If a NASA Research Announcement is to be used to solicit advanced-concept studies, the Program Executive and Program Scientist work together to prepare it. <i>(See HQOWI8310-S018 for instructions on preparation and release of a NASA Research Announcement.)</i>
6	Program Executive	For an advanced-concept study performed by a NASA Center, the Program Executive prepares a letter of direction and a task statement and facilitates funding of the task using funds indicated by the Associate Administrator for Space Science or the cognizant OSS Science Division Director.
7	Associate Administrator for Space Science <i>or</i> Science Division Director	The Associate Administrator for Space Science or the cognizant OSS Science Division Director approves and signs the letter of direction.
8	Program Scientist Science Division Director	The Program Scientist and cognizant OSS Science Division Director interact with the science community to seek agreement on a consensus concept via workshops supporting the development of the science roadmap.
9		If a consensus concept is identified and accepted as a new roadmap mission, proceed to Step #10. If not, end the process.

Subject: Program Pre-Formulation**6. PROCEDURE** *(continued)*

<u>STEP #</u>	<u>ACTION OFFICERS</u>	<u>DESCRIPTION</u>
10	Science Division Director	If the consensus concept is accepted, the cognizant OSS Science Division Director appoints the science participants for Science and Technology Definition Teams (STDT's) to mature the advanced concept into a pre-concept.
11	Program Executive	The Program Executive and the NASA Centers involved in theme activity support the STDT with spacecraft-concept studies, costing, engineering analysis, and technology support. The STDT product is a report that is coordinated with the science community using the science advisory bodies. The report contains, as a minimum, science objectives, operations concepts, mission-design architectures, spacecraft concepts, cost, schedule, risk, and identification of required new technology. Several STDT's may be constituted to update or mature the pre-concept before an Announcement of Opportunity for mission investigations or instruments is released.
12	Program Executive Program Scientist	The Program Executive and Program Scientist work together to develop an Announcement of Opportunity for mission investigations and/or science instruments. <i>(See HQOWI8310-S019 for instructions on preparation and release of an OSS Announcement of Opportunity.)</i> All STDT's are dissolved prior to the issuance of an Announcement of Opportunity for instruments to prevent any unfair competitive advantage. The Program Executive ensures that the applicable program or project for the mission supports the proposal evaluations, led by the Program Scientist. This allows the Program Office or Project Office to gain an understanding of the cost, schedule, and technical assumptions associated with the mission. Program Executive participation enables him/her to assess the technology readiness of the mission elements.

Subject: Program Pre-Formulation**6. PROCEDURE** *(continued)*

<u>STEP #</u>	<u>ACTION OFFICERS</u>	<u>DESCRIPTION</u>
13	Program Executive Program Scientist Science Division Director Technology Director	The Program Executive works with the Program Scientist, cognizant Science Division Director, and Technology Director to determine if the spacecraft and instrument technology is sufficiently mature (e.g., typically required to be at Technology Readiness Level (TRL) of 6 or higher at time of selection) to allow transition of the pre-concept to the Concept Definition (Phase A) aspect of the Formulation subprocess.
14		If the technology is sufficiently mature, end the process. If the spacecraft or instrument technology is not sufficiently mature, proceed to Step #15.
15	Program Executive	The Program Executive leads the development and coordination of an integrated technical, cost, and schedule approach to attain maturity of the spacecraft or instrument technology. This technology maturation or development activity may include one or more of the following OSS technology elements: (a) focused-technology development dedicated to high-priority technologies needed for specific science missions; (b) core-technology development of fundamental capabilities that support multiple applications; and (c) flight validation of key mission-enabling or enhancing technologies. “Focused” technologies are mission-specific and are managed by the program requiring their use. Accordingly, any technology developed in this manner is authorized by the using program’s Formulation Authorization Document (see HQOWI7120-S022).

[continued]

Subject: Program Pre-Formulation**6. PROCEDURE *(concluded)***

<u>STEP #</u>	<u>ACTION OFFICERS</u>	<u>DESCRIPTION</u>
15 <i>[concluded]</i>	Program Executive	<p>“Core” technologies are products of the technology roadmap that have relevance across multiple science themes and programs and are managed separately from the programs or projects that use them. Program Executives involved with programs requiring core-technology development should conduct periodic reviews with the technology developers and stakeholders to evaluate progress against the implementation plans.</p> <p>The “flight-validation” technology element is accommodated by the New Millennium Program (NMP) which has been formulated to develop and flight-validate mid-TRL technologies in order to minimize their risk of first use. Flight-validation activities are competitively selected in accordance with the processes outlined in the NMP Program Plan.</p> <p><i>[This program pre-formulation process ceases when Formulation Authorization is initiated per HQOWI7120-S022.]</i></p>

Subject: Program Pre-Formulation**7. QUALITY RECORDS**

RECORD IDENTIFICATION	OWNER	LOCATION	MEDIA: ELECTRONIC OR HARDCOPY	NPG 1441.1 SCHEDULE NUMBER AND ITEM NUMBER	RETENTION/ DISPOSITION
Letter of Direction	Secretary for OSS Deputy Associate Administrator for Programs	OSS Programmatic files	Hardcopy	Schedule 7, Item 5A3a	* Permanent* Retire to FRC when 2 years old. Transfer to NARA when 20 years old.
Task Statement	Secretary for OSS Deputy Associate Administrator for Programs	OSS Programmatic files	Hardcopy	Schedule 7, Item 5A3a	* Permanent* Retire to FRC when 2 years old. Transfer to NARA when 20 years old.

[NOTE #1: These "quality records" are identified in Section 5 ("Flowchart") of this OWI via bold-text titles and shadowing of the border of their symbols.]

[NOTE #2: In accordance with NPG 1441.1 NASA Records Retention Schedules, "... installations' office of primary responsibility will maintain one official record copy ...; reference copies may be maintained for related work". Therefore, the "Retention" and "Disposition" aspects of quality records apply only to the one official record copy of each quality record.]